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SYLLABUS

OF A

COURSE OF LECTURES

ON

BOTANY.

BY

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P R E F A C E.

FROM a Syllabus of Lectures considerable advantages may be derived by the pupil, while the teacher may perhaps find several difficulties in the composition, and some embarrassment from the completion of such a work. All science is progressive, and the opinions of to-day may, from new discoveries and observations, need correction to-morrow. A lecturer may also frequently express himself with less perspicuity and force, when limited to a printed train of ideas, than if he were perfectly at liberty to follow his own thoughts upon each subject as they might happen to arise.

Such considerations have hitherto deterred me from publishing a Syllabus; but they have all at length yielded to the persuasion of my intelligent friends and patrons at Guy's Hospital. I offer the following sketch with the less hesitation, as the plan is mostly original. The physiological part of botany has scarcely been taught in any school, except under the late Dr. Hope
at

at Edinburgh, where indeed this curious and interesting branch of a philosophical medical education was not always received as it deserved. The attention however which that excellent teacher merited, has been overpaid to his pupil, who is happy in acknowledging, on this occasion, how much he owes to his information and friendship.

London,
April, 1795.

SYLLABUS OF BOTANY.

THE term Botany, derived from Βοτάνη, an herb, or grafs.

Distinction of Natural bodies into Animals, Vegetables and Minerals—obvious, and very ancient—on minute examination more difficult.

Formerly the fossil kingdom was supposed most difficult to be distinguished from the other two: now we are more at a loss to discriminate animals and vegetables.

Jungius's definition of a plant — *Isagoge*, cap. I.

Planta est corpus vivens non sentiens, s. certo loco aut certæ sedi affixum, unde nutriri, augeri, denique se propagari potest.

In some degree applicable to Corals and Coralines, and excludes *Fuci*, &c.

Boerhaave's—

Planta est corpus organicum, alteri cuidam corpori cohærens per aliquam partem sui, per quam nutrimenti & incrementi & vitæ materiam capit & trahit.

Not correct.

Tournefort's—much more faulty.

Planta est corpus organicum, quod radicibus semper, seminibus forte semper, floribus & caulibus fere semper donatur. Ifagoge, 54.

Others erroneously make a locomotive power essential to animals.

Linnæus's definition, *Philosophia Botanica*, sec. 3.

Lapides crescunt. Vegetabilia crescunt & vivunt. Animalia crescunt, vivunt & sentiunt, (& se movent motu possibili. MSS.)

Neat, but liable to objections—consider these.

Growth of stones, of what nature.

Life in plants.

Have

Have they sensation? They have irritability, witness the Barberry, the *Mimosæ*, *Oxalis sensitiva*, *Smithia sensitiva*, &c.

They have even spontaneous motion—*Valisneria*, *Nymphæa alba*, *Ruta*, &c.

Plants evidently sensible to stimuli.

The want of sensation at least not sufficient for us *practically* to distinguish Vegetables from Animals.

Chemical tests—See *Watson's Essays*, vol. 5, 158.

Dr. Alston's and Dr. Monro's ideas.

A Plant a *living* being—organized—developed and increased by nourishment—forms secretions.

Marks of perception—*apparent* only.

Plants subject to diseases.

Gangrene or Sphacelus—slow or rapid—in the Nopal of Mexico, *Cactus coccinellifer*,—its remedy.

Power of sloughing off diseased parts—fall of

the leaf—in autumn—or when shrubs are removed—its curious circumstances. Falling of ripe fruit.

Injuries from Insects—Their action on the vital principle.

Galls—Bedeguar—Apples of *Salvia pomifera*—Horns of *Lentischus*—Branched excrescence on Willows.

These often acid.

Fasciculated stems.

Leprosy—Honey dew.

Diseases of the *Anthera*.

VEGETABLES composed of

1. *Medulla* or Pith.—Nervous matter?
2. Cortical substance, wood and barks,

Cortical substance composed of—1. Woody fibres.—2. *Vasa propria*, for secreted fluids.—3. Air vessels, the latter not in the bark.

VEGETABLE BODY examined from without inward.

Cuticle, *Epidermis*.

Its use and importance.

Appearance—structure—and physiology.

Experiments of Du Hamel.

Cellular integument—*Enveloppe cellulaire* of
Du Hamel.

Not much investigated.

Bark, *Cortex*.

Composed of—1. Longitudinal woody fibres,
which are sap-vessels.—2. *Vasa propria*, and
3. Cellular substance—no air vessels.

Of one layer in herbaceous plants—in trees of
many.

Liber, or innermost layer—renewed every
year—the important part.

Use

Use of the bark.

Restored by extension only. Mr. Forsyth's experiments.

Wood—*Lignum*.

Composed of—1. Woody fibres, or sap-vessels—2. *Vasa propria*—3. Cellular substance—4. Air vessels.

In trees and shrubs of many layers—one formed every year—most dense in cold seasons.

Origin of the wood. Opinions of Malpighi, Grew, and Hales.

Du Hamel's and Dr. Hope's most decisive experiments, proving it originates from the bark.—Wood does not form bark.

Linnæan opinion, that the *medulla* formed wood, erroneous.

Alburnum—the layer of new wood.

Pith—*Medulla*.

Composed of much cellular substance.

Opinions

Opinions of Du Hamel and Linnæus.

Medium opinion probably nearest the truth.

VASCULAR SYSTEM of Plants.

Sap-vessels, or Woody Fibres—*Vasa*
Lymphatica.

Reasons for presuming these to be sap-vessels, or to contain the lymph, which is analogous to the blood of animals.

Their structure—and situation.

How are the fluids of plants propelled? and is there a circulation of their sap?

Air-vessels, *Tracheæ*, analogous to Lungs.

Their structure and appearance—large and numerous.

Easily seen in the Vine, Elder, Orange Lily,
Iatropa

Iatropa multifida, &c.—best in young wood—
not found in the bark.

In the winter seem irritable.

Contain air, with a little moisture.

Their supposed uses.

Vasa Propria—Vessels containing secreted
Fluids.

Their situation and appearance.

Various contents.

Review of the Vegetable Anatomy.

VEGETABLE FLUIDS.

Lymph, or Sap—its sensible qualities—how
obtained—its changes.—Analogous to blood.

Insensible perspiration.

Motion

Motion of the sap—in every direction—probably not in a circulation.—Dr. Hope's suspended Willow—Inverted trees, &c.

Succus proprius—secreted fluids—most from the bark.

Gum—in Plum, Peach, &c.

Resin—Fir, Juniper.

Milky—(emulsion)—Fig, Spurge. White or Yellow.

Aromatic, Bitter, &c.—Cinnamon, Peruvian Bark.

Red in *Rumex sanguineus*, and Red Cabbage: Accidental?

Seat of the different qualities of plants, except such as are mechanical.

Variety of secretions in the Peach-tree.

Use of the secreted fluids.—Not analogous to blood, as Du Hamel thought.—Analogous to fat?

Very constant — witness the operation of Grafting.

Principles and theory of Grafting.

Odour of plants—resinous—volatile essential oil.

Taste of plants—the acrid ones often destroyed by drying.

Certain secretions common to very different plants.

Sugar—Gum—which of these has most analogy to fat ?

Camphor—Smell of new hay,

Heat of Vegetables.

VEGETATION.

Its process.—Air necessary.

Cotyledons—their use, form, and number.

Seeds—how destroyed or preserved.

PARTS

PARTS of a PLANT.

ROOT—*Radix*. Its use and physiology.

Its parts—*Caudex* and *Radicula*.

Various forms of the root.

Spindle-shaped—*fusiformis*.—Carrot.

Tuberous — *tuberosa*.—Potatoe.—Palmate—
Fasciculate.

Fibrous—*fibrosa*.—Grasses.

Creeping—*repens*.—Mint.

Abrupt—*præmorsa*.—Devil's-bit.

Bulbous — *bulbosa* — solid, Tulip — tunicate,
Onion—scaly, Lily.—Analogy with buds, *gem-
mæ*.

Granulated—*granulata*.—Wood Sorrel.

Change of some fibrous roots into bulbous
ones.

Great importance of the knowledge of roots in agriculture or gardening.

STEM, or TRUNK—*Caulis*—Seven kinds enumerated by Linnæus.

1. Stem—*Caulis*—properly so called, bearing leaves and fructification.—Its various forms and appearances—deformities.

2. Straw—*Culmus*. In Grasses.

3. Stalk—*Scapus*.—Bearing the fructification, the leaves not being raised above the ground.

4. Flower-stalk—*Pedunculus*.—Bearing the fructification upon the stem.

5. Foot-stalk—*Petiolus*.—Stalk of a leaf.

6. Frond—*Frons*.—Stem, leaf, and fructification united.

7. Stipe *—*Stipes*.—Stalk of a frond, or of a Fungus.

* Martyn's Language of Botany.

BUDS—*Gemmæ*.

Their physiology and use—analogy with bulbs
—*Dentaria bulbifera*, *Lilium bulbiferum*.

Situation and structure of buds.

Observations of Loeffling (*Linn. Amœn. Acad.*
V. 2.) and Grew.

LEAVES—*Folia*.

Infinite variety and elegance of their forms—
pleasing colour—œconomical uses.

Situation—alternate—opposite, &c.—Inser-
tion—Position and direction.

Foot-stalks—*Petioli*—their various forms.

Stipules *—*Stipulæ*—their use and appear-
ance.

Forms of leaves—simple or compound.

Margins—Points—Surface.

* Martyn's Language of Botany.

FUNCTIONS

FUNCTIONS of LEAVES.

Opinions of old authors.

Progress of our present knowledge of this curious subject.

Leaves the organs of insensible perspiration—and of absorption.—Imbibe air.—Light acts upon them.

Experiments on their absorption and perspiration—by day and night.

Liquor perspired.

Sensible perspiration—various.

Difference in the absorbing power of different leaves.

Aquatic plants.

Air—its effects on Vegetables.

Ancient opinions.

Malpighi and Grew each separately discovered the air-vessels.

Opinions and experiments of Hales and Du Hamel.

Discoveries

Discoveries of Priestley and Ingenhous.

Mode in which vegetables imbibe and discharge air.

Qualities of that air—sometimes combined with poisonous secretions.

Light necessary to the production of pure air from leaves.

Various effects of light upon plants.

Turning of leaves and branches to the light—also of many flowers.

Some leaves much less affected by light than others.

Irritability of some leaves, and spontaneous motion of others—*Hedysarum gyrans*.

Sleep of plants.

APPENDAGES to a Plant—*Fulcra*.

Term a little forced.—None universal.—Seven kinds according to Linnæus.

1. Stipule

1. Stipule—*Stipula*—already mentioned—*extrafoliaceæ*—*intrafoliaceæ*.

2. Floral-leaf—*Bractea*—accompanies the flower—very various in form and colour.—*Tilia*. Seeming metamorphosis of leaves into barren bractæ in *Salvia Horminum*, *Lavandula Stoechas*, &c.

3. Thorn—*Spina*—arises from the wood itself—*Prunus*, *Rhamnus*, *Celastrus*, &c.

Disappears by culture in *Pyrus sativus*.

Footstalk of the leaves becomes a spine in *Astragalus Tragacantha*.

4. Prickle—*Aculeus*—arises from the bark only—*Rosa*, *Rubus*, &c.

Less liable to disappear by culture.

5. Tendril—*Cirrhus*—spiral—simple or divided—*Vitis*, *Passiflora*.—Turns variously—sometimes terminates the footstalk—*Pisum*, &c. or the leaf—*Flagellaria*.

6. Gland—*Glandula*—discharges secreted fluids—Moss Rose, *Salix pentandra*, &c.—On the footstalks of *Passiflora*.—Liquor resinous or saccharine.

7. Hair—*Pilus*—including all the various pubescence of plants.—An excretory duct, according to Linnæus.—Often jointed—hooked—forked—branched.

INFLORESCENCE—*Inflorescentia*.

Modus florendi of old writers.

Whorl—*Verticillus*—*Mentha*, &c.

Cluster *—*Racemus*—*Ribes*.

Spike—*Spica*—*Veronica*.

Corymb † — *Corymbus* — *Brassica*. — Often lengthened out into a *Racemus*.

Fascicle—*Fasciculus*—*Dianthus barbatus*.

Tuft—*Capitulum*—*Gomphrena*.

Umbel—*Umbella*—*Rundle* in old English.—*Daucus*.—Natural order of *Umbelliferæ*.—Umbels simple or compound—naked, or with *involucra*.

Cyme—*Cyma*—*Viburnum Tinus*.

* *Raceme*, Martyn.

† Martyn.

Panicle—*Panicula*—*Avena*, and many grasses.
Saxifraga umbrosa.

Bunch—*Thyrſus*—*Syringa*.—A denſe panicle.

Flowers ſolitary—axillary—radical.—On the foot-ftalk of the leaf in *Turnera*.

Either ſeffile, or on flower-ftalks—erect, or drooping.

Moſt elegant ſpecific characters, according to Linnæus, are taken from the *inflorefcence*.

FRUCTIFICATION—*Fructificatio*.

Flower and Seed—Eſſential—Organs of propagation.

Beautifully defined by Linnæus in *Phil. Bot.* 52. “*Vegetabilium pars temporaria, generationi dicata, antiquum terminans, novum incipiens.*”

Conſiſts of ſeven parts.

Calyx, *Corolla*, *Stamen*, *Piſtillum*, *Pericarpium*, *Semen*, and *Receptaculum*.

Flos completus—*incompletus* (no *corolla*)—*nudus* (no *calyx*).

CALYX—or Flower-cup.

Of seven kinds—not essential to a flower.

1. *Perianthium*—Calyx, properly and commonly so called—contiguous to the rest of the flower, and in fact making a part of it.—Its various forms.

2. *Involucrum*—remote from the flower—Umbelliferous plants?—Some species of *Anemone*, &c.—Allied to *Bractea*, and perhaps scarcely distinguishable from it.—Linnæus's reasons for separating them—that he might make use of this part in his generic characters of *Umbelliferæ*.

3. *Amentum*—Catkin—Calyx of several scales united to an oblong common receptacle, permanent, and finally enlarged into a *strobilus* or cone.—Fir.

4. *Spatha*—Sheath—bursting longitudinally—*Narcissus*, *Arum*, and Palm-trees.

5. *Gluma*—Husk—Valves embracing each other, chaffy—Grasses and grass-like plants.

Arista—Beard, or Awn.

6. *Calyptra*—Hood of Mosses, covering the capsule.

7. *Volva*—Veil of the Fungus tribe.

The two last scarcely to be deemed Calyces.

“Calyx from the outer bark” — *Linn.* — scarcely.

“*Perianthium* differs from *Bractææ* in fading when the fruit ripens, if not before.” *Linn. Phil. Bot. sec. 89.*—Poppies.—Durable, though faded, in Apples and Pears.

Use of the Calyx.—Protection.—Respiration?

Often wanting.

COROLLA—Vulgarly called Leaves of the Flower—not essential.

Its structure and appearance—supposed by Linnæus to originate from the *Liber*—not probable.

Consists often of two parts—Petal (*Petalum*) or Petals, and Nectary (*Nectarium*)—the latter not always a part of the Corolla.

Corolla

Corolla monopetalous or polypetalous.

Monopetalous divided into *Tubus*, (tube) and *Limbus*, (limb).

In form, 1. regular—2. irregular.

1. *Corolla campanulata, infundibuliformis, hypocrateriformis, rotata, globosa, &c.* 2. *ringens, incompleta—Amorpha*, and *Rittera* of Schreber.

Polypetalous — Petal divided into *Unguis*, (claw) and *Lamina*, (border*).

1. Regular—2. irregular.

1. Most flowers—*Rosa, Ranunculus*, Cruciform plants, &c.—2. Papilionaceous plants, &c.

Corolla, how to be distinguished from a calyx, when both are not present? — Difficult.—In *Daphne* both are united, according to Linnæus, *Phil. Bot.* 58.—yet *Gnidia* having petals, shows *Daphne* to have only a coloured calyx.—Petals mostly (not always) alternate with the *stamina*, calyx opposite to them.—Not a certain criterion.—Opinions of Jussieu and others.

Corolla not always more coloured than the calyx—*Bartisia, Dombeya*?

* Martyn.

Use

Use of the Corolla—defence and shelter.

Serves as wings to waft the flower about, and aid the impregnation. *Linn.*

An attraction to insects, and a convenient seat or bed for them while extracting the honey, and promoting the impregnation of the flower. *Sprengel.*

Possibly it fulfils some important function, with respect to air or light, towards the young seeds, or the pollen.

Spadix of the *Arum* analogous to petals in this respect?

Corolla in some instances very caducous, in others permanent. — In double flowers more lasting than in single ones, hence its probable connection with the impregnation. — *Philos. Trans.* for 1788, p. 165.

Irregular flowers sometimes vary into regular ones, *Antirrhinum*, *Bignonia radicans*.

* * *

Nectarium — Nectary, or Honey-cup — part which secretes, or which contains the honey.

Not universal, though perhaps nearly so.—

Often

Often merely the lower part of the corolla secretes honey, without any particular apparatus.

Nectary a process of the corolla, in *Viola*—or a distinct organ—either like petals as in *Aquilegia*, more different as in *Helleborus*, *Aconitum*, &c.—or glandular—*Geranium*, Cruciform plants, &c.

Linnæus called every thing, not calyx, petals, or organs of propagation, *Nectarium*.—Right enough for botanical distinctions, if not always right, though much blamed. Sometimes he errs in calling abortive stamina *nectaria*—As L'Heritier in *Erodium*.

Nectary sometimes in the calyx — *Tropæolum*.

* * *

Honey, or *Nectar*—its nature and probable uses.

“Analogous to *Liquor Amnii*,” *Pontedera*—
“but found also in barren flowers”—*Linnaeus*.

Tempts insects to assist the impregnation.

Sometimes poisonous—to men, not to bees.

STAMINA—Stamens, or Chives—organs of impregnation—essential.

Situation—external with respect to the fruit.

Number various.

Filamentum and *Anthera* — the latter only essential—capsular—contains *Pollen*.

Pollen—the impregnating dust—capsular—bursts in moisture—contains the matter immediately acting on the embryo of the seeds.

Stamina changed to petals in double flowers, therefore abortive—often obliterated by excessive nourishment, or when the plant increases much by root.

PISTILLA—Pistils, or Pointals—organs impregnated by the *pollen*—essential.

Situated within side of the *stamina*, and generally fewer—sometimes in a different flower—even on a different root.

Consist of three parts—1. *Germen*, which is essential.—2. *Stylus*, not so.—3. *Stigma*, essential.

Germen,

Germen, seed-bud—situation superior or inferior to the flower—forms various.

Stylus, style—when present connects it with the.

Stigma, summit—its various structure—downy—moist with a peculiar fluid—receives the pollen.

Pistils likewise changed to petals in double flowers—sometimes merely obliterated.

PERICARPIUM—Seed-vessel—germen enlarged.

Sometimes wanting, the naked seeds being guarded by the calyx.

Use, to keep the seeds till ripe, then generally to disperse them.

Form and structure very various—8 kinds enumerated by Linnæus.

1. *Capsula*—Capsule—consists of

Valvulae, Valves.

Dissepimentum, Partition, separating the cells.

E

Columella,

Columella, central column, to which the seeds are generally attached.

Loculamentum, cell.

The capsule is of either one or more cells—and bursts in various modes, sometimes elastically. It is sometimes clothed with pulp—*Cucubalus bacciferus*.

2. *Siliqua*—Pod—of two valves, the seeds fixed to each future—*Tetradynamia*.

3. *Legumen*—Legume—of two valves, seeds fixed to one future only—as in *Pisum*, pea.

4. *Folliculus*—Follicle—of one valve, bursting longitudinally—*Embothrium*, *Asclepias*, *Apocynum*, &c.

5. *Drupa*—Stone-fruit—fleshy, containing a nut—Peach.

6. *Pomum*—Apple—fleshy, containing a capsule—*Pyrus*.

7. *Bacca*—Berry—fleshy, containing seeds imbedded in pulp—*Ribes*, *Atropa*, &c.

8. *Strobilus*—Cone—*Amentum* hardened and enlarged into a seed-vessel—*Pinus*.

SEMINA—Seeds—

The “end and aim” of the fructification—
consist of

Corculum—bud of the future plant, *Embryo*
of Gærtner, (heart of a walnut), which, by be-
ginning to vegetate, becomes the *Plumula*—rudi-
ment of leaves.

Cotyledon—seed-lobe—1, 2, or very rarely
more.

Vitellus—yolk—(Gærtner) closely attached to
the Embryo in some plants, and seeming to
nourish it at the beginning of vegetation—soon
withering—never rises with the Seed-lobes.

Albumen—white—invests the Seed-lobes in
some plants, not in all—nourishes them—ob-
served by Grew, much noticed by Gærtner.

Testa—skin—outer covering.

Membrana—membrane—thin white internal
skin.

Hilum—scar of attachment.

Arillus — Tunic — either capsular (Mallow
and Geranium tribe, and *Cynoglossum*)—elastic,
E 2 (Diosma)

(*Diosma*)—or pulpy, (*Euonymus*).—How distinguished from a capsule—chiefly by analogy of other plants.

Coronula—Crown.

Pappus—Down—Dandelion.—Seffile, or Stipitate.

Ala—Wing—Ash, *Embothrium*, &c.

Modes of the dispersion of seeds—hooks—*aristæ*—&c.

RECEPTACULUM — Receptacle —base, or point of connection.

Best seen in compound flowers (*Helianthus*, &c.) and there of importance—naked—cellular—scaly—hairy, &c.

PROPAGATION OF PLANTS—*Sexus*.

Barren flowers—furnished with stamina only.—*Masculi*.

Fertile

Fertile flowers—furnished with pistilla only.
—*Fæminei*.

Perfect ————— with both. — *Her-*
maphroditici.

Palm trees among the ancient Greeks.—*Pista-*
sia and *Ficus*.

Old botanists inattentive to this—*Bauhin*—
Mercurialis testiculata, *sive mas*, &c.

Morison, Tournefort, Pontedera, incredulous
of the doctrine now received.

* * *

Sir Thomas Millington in 1676 hinted to
Grew the true use of the *antheræ*—Grew adopted
his opinion—Ray approved it—Camerarius con-
ceived the same idea.

Lewenhoek's Theory * applied by Morland
(*Phil. Trans.*) to plants—erroneously—witness
Mirabilis.

Vaillant wrote an oration on the subject—
Blair, Bradley assented.

* *Vermiculi in semine*.

Pontedera

Pontedera in 1720 opposed their opinions entirely in his *Anthologia*.

Linnaeus in 1732 reviewed all that had been done, and completely established the fact in his *Fundamenta Bot.*, *Phil. Bot.* &c.

Plants live—agreed—from their spontaneous propulſion of fluids, evolution, ſecretions, irritability, death. — Ages like animals — infancy, youth, maturity, old age.

Æquivocal generation now need not be controverted—*Omnia viventia ex ovo*—true in fact—in Birds and Inſects literally ſo—in *Amphibia* and Fiſhes nearly univerſal—Analogy with the ſeeds of plants perfect.—Polypes indeed are moſt generally propagated by branches; yet even theſe animals have eggs.—Plants agree with ſuch animals in being propagated, not only by ſeeds, but by roots, cuttings, and buds.

No ſeeds produced without *ſtamina* and *piſtilla*, though buds are.—Proved by innumerable experiments.

Experiment of Linnaeus on Hemp opposed to that of Spallanzani on the ſame plant—(*Linn.*

on the *Sexes of Plants*, Lond. 1786, p. 34.)—of Spallanzani on Spinach—inconclusive—barren flowers of Spinach are generally intermixed with the fertile on the same plant.

Flowers always precede fruit.

Flowers always furnished with *stamina* and *pistilla*, in the same or a different individual—even Mosses (*Hedwig, Micheli*)—Valisneri found them in *Lemna*.

Most flowers have *stamina* and *pistilla* together—even trees of *hot* countries—in *cold* ones not always, because their leaves are deciduous, and not an impediment to the conveyance of *pollen*. *Corylus*, &c.—Insects abound in trees.

Pontedera reduced to seek figures in the *Hortus Malabaricus* without *stamina*!—those figures now known to be faulty.

Some flowers have barren or abortive *stamina*, others abortive *pistilla*—*Musa, Rhodiola*, &c.

Tournefort and Pontedera thought the *pollen* excrementitious—or that the *Antheræ* were kidneys—or that they might secrete a matter which circulates to the *germen*—altogether erroneous—the last opinion absurd, from the *stamina* not
 6 being

being always in the same flower with the *germen*.

Pollen not excrementitious, because elaborately organized, and capsular—various in structure—globular, angular, smooth, prickly, convoluted, double globes, &c. in *Acer* a globe, which when moist bursts into the form of a cross.

Pollen always ripe when the *Stigma* is so—*Stigma* withers and falls off with the *Antheræ*—Umbelliferous plants (observed by Pontedera) not an objection.

Gaping *Stigma* of *Viola tricolor*, *Gratiola*, *Martynia*, &c.

Stigma moist at certain times—*Amaryllis formosissima*—irritable in *Martynia*.

* * *

Proportion and Situation.

Stamina shortest in most drooping flowers, *Galanthus*, *Leucojum*,—longest in many erect ones.—Barren flowers above the fertile ones in *Carex*, *Coix*, *Ricinus*, &c.

* * *

Approximation

Approximation of the stamina to the pistilla, by various means—1. by spontaneous motion, in *Saxifraga*, *Parnassia*, *Ruta* and many others,—2. by contraction of their connecting membrane, in *Celosia*,—3. by their elasticity, in *Parietaria*, *Kalmia*,—4. by elasticity of the germen, in *Medicago falcata*,—5. by irritability, in *Berberis*.

Yet the *stamina* of *Cistus Helianthemum* and *Cactus Tuna* withdraw from the styles when touched—for what purpose?

* * *

Rain and dews — hostile to impregnation, causing the *pollen* to explode uselessly—hence

Rye is often barren—not Barley, because its *antheræ* project less—*Linn.*—Juniper in Sweden frequently barren.—Pears often fail—Cherries less precarious; their *antheræ* not all ripe at once.

Drooping flowers—*Fritillaria*, *Campanula*, &c.—not from weight—the fruit of *Fritillaria*, ten times heavier than the flower, is erect.

Many flowers which droop or close in moisture, or at night, are upright and expanded in fine weather.

Convolvulus arvensis, *Anagallis arvensis*—when closed indicate approaching rain—yet if either
F
impregnated,

impregnated, or deprived of their *stamina*, they lose their sensibility.

Celofia—its *stamina* sheltered in wet weather.

Papilionaceous flowers gape in fine weather.

Aquatic plants—their œconomy—*Nymphaea*,
Valisneria !

Caprification—the manner in which the fig is impregnated by insects.

Insects busy about flowers in bright warm weather, tempted by honey—their utility infinitely various.

EXPERIMENTS on the Propagation of Plants.

Palm cultivators know the unimpregnated Dates to have no stone, as Tournefort records.

Date Palm at Berlin, long barren, till impregnated by flowers of the stamen-bearing tree sent from Leipzig by post—It then bore ripe fruit, whose seeds vegetated at Upsal. *Linn.*

Melons and Cucumbers, stripped of their
barren

barren flowers, perfect no fruit—The admission of air is useful to them.

Observations of Linnæus on *Rhodiola*, *Antholyza Cunonia*, *Clusia pulchella*, *Datisca cannabina*, *Iatropa urens*, *Cannabis sativa*, &c. Removing *antheræ* does not in itself make the fruit abortive, *Chelidonium corniculatum*.

Striped flowers, Tulips, Stocks, &c.

* * *

Hybrid, or Mule Plants—accidental or artificial.

Delphinium hybridum; *Tragopogon hybridum*, from *T. pratense* impregnated by *T. porrifolium*—flowers purple, yellow at the base. *Linn.*

Cheiranthus Cheiri sprinkled with pollen of a Tulip—germen swelled to a morbid degree—no seeds.

Fairchild's Mule Pink.

Cape Geraniums (*Pelargonium*) frequently intermix—hence many varieties, often permanent—Analogy with insects, *Chrysomelæ*, *Coccinellæ*.

Mule plants, from parents nearly akin, often

F 2

propagated

propagated by seeds to a certain degree—from different ones not.

THEORETICAL REMARKS— Analogies.

Physiology of Vegetable Propagation—obscure.

Rudiments of seeds exist before impregnation.
Spallanzani.

Plants in certain circumstances produce flowers, in others branches without end. *Solandra grandiflora*—a different *action* (*J. Hunter*).

DISEASES of the *Antheræ*.

Swelling, and producing a purple powder instead of true *pollen*—*Lychnis dioica*, *Cucubalus Behen*.

Barrenness of Corn from the neighbourhood
of

of *Berberis*, scarcely credible—of Hemp from *Cuscuta* and *Orobanche*, more probable.

Diseases of the Seed.

Ergot of the French—cause unknown—Rev. Mr. Bryant's theory of the constriction of the flower not satisfactory.

Steeping the parent seed in lime water a certain preventative, according to Brouffonet, though quite inexplicable.

Leprosy in *Tragopogon majus* does not injure the seed. *Davall*.

In weak soils Nature undertakes to perfect but few seeds — Arabian Coffee — Barley in Siberia, &c.

SYSTEMATIC ARRANGEMENT.

Its use, and indeed necessity.

Unknown to the Ancients, except—Trees, Shrubs, Herbs.

Earlier

Earlier Botanists among the moderns unavoidably fell into some arrangement, as grasses, bulbous plants, medicinal or eatable plants, &c.

Conrad Gefner and Cæsalpinus first conceived the idea of a regular classification by means of the parts of fructification.

The first has left hints only.

Cæsalpinus published a system founded on the fruit, except only the first division into trees and herbs.

Its principles.

Morison follows Cæsalpinus almost entirely, without mentioning him.

Ray's method is somewhat different, but chiefly on the fruit, as are Hermann's and Boerhaave's, with little originality.

Rivinus, Tournefort, Ruppius and Ludwig formed systems on the *corolla*.

Tournefort's the best, but quite insufficient.

Its principles—Corolla simple or compound—monopetalous or polypetalous—regular or irregular—&c.

Magnol

Magnol and Linnæus formed methods upon the *calyx*.

Linnæus first thought of a system of arrangement founded on the *Stamina* and *Pistilla*—taking into consideration their number, situation and proportion.

Linnæus first distinguished between a *natural* and an *artificial* method—his system a compound of the two.

Remarks on Natural Orders.—*Jussieu's Genera Plantarum*.

Principles of the Linnæan Method.

Genera—Species—Varieties—their supposed limits.

Genera first well understood by Tournefort, but not always established on solid principles—Linnæus first insisted on their being founded on the 7 parts of fructification.

Linnæus also insisted on Genera being *natural*, as well as Species.

Arguments

Arguments for and against this opinion—the most difficult part of botany—greatest difficulty in distinguishing Genera in natural orders.

Some Genera obvious and indubitable—*Quercus*, *Rosa*, *Iris*, *Euphorbia*, *Begonia*,—others obvious, but their character obscure, as *Valeriana*.

A Genus may consist of one species, as *Paris*, or of many.

Classes and Orders ought to give way to Genera, because less natural.

Nomenclature—its Principles.

How vague anciently—now fixed.

Generic and Trivial names—their principles and utility.

Generic names either of ancient unknown origin—or expressive of the quality, use, form or appearance of the plant—or its essential character—or in honour of botanists.

Trivial names to be formed on similar principles, with less strictness.

Those which express something in addition to the essential botanic character perhaps preferable to such as express merely that character.

LINNÆAN SYSTEM—

Professedly artificial.

CLASSES 24.

The first 11 founded solely on the number of the *stamina*.

- | | | |
|---------------|------------|---------------------------|
| 1. Monandria | Stamen 1. | μόνος one, ἀνὴρ
a man. |
| 2. Diandria | Stamina 2. | |
| 3. Triandria | ———— 3. | |
| 4. Tetrandria | ———— 4. | |
| 5. Pentandria | ———— 5. | a numerous
class. |
| 6. Hexandria | ———— 6. | |
| 7. Heptandria | ———— 7. | a very small
class. |
| | G | 8. Octandria |

8. Octandria Stamina 8.

9. Enneandria ——— 9. a small class.

10. Decandria ——— 10.

11. Dodecandria ——— 12 to 19.

12. Icofandria ——— 20, not often more,
inserted into the calyx. A natural class. Pulpy
eatable fruits. This mode of insertion indicates
wholesome fruits in other classes, as *Ribes*.

13. Polyandria—Stamina numerous, *inserted
into the receptacle.* Very distinct in nature from
the last.

14. Didynamia—2 long stamina, and 2 short
—dis twice, *δυναμις* power. A natural class. Con-
tains most of the ringent flowers.

15. Tetradynamia—4 long stamina, and 2
short—*τεσσαρες* four, *δυναμις* power. A very na-
tural class—Cruciform flowers—alkalescent.

16. Monadelphica — Stamina united at the
base into a tube—*μόνος* one, *αδελφός* a brother.
—The mallow tribe.

17. Diadelphia—2 parcels of united stamina
—papilionaceous flowers—natural, except that
some papilionaceous plants with distinct stamina
are excluded.

18. Polyadelphia—more than 2 parcels of united stamina.

19. Syngenefia—Stamina united by their *antheræ*, rarely by their filaments also—*συν* and *γενεσις* joint production.—Compound flowers, except the last order—very natural except that order.

20. Gynandria—Stamina and Pistilla united above the receptacle, or rather above the germen—*γυνή* a woman, and *ανηρ* a man.

21. Monoecia—Stamina and Pistilla in separate flowers, but on the same plant, that is (as the name expresses) in one house—*μόνος* one and *οικος* a house.

22. Dioecia—Stamina and Pistilla in separate flowers, and on two separate plants, or in two houses.

These two classes are natural when the barren, or stamen-bearing, flowers have a *different structure* from the fertile ones ; but not so when they have the same structure, because then both organs are liable to meet in the same flower. In some plants each flower has always the rudiments of the other part, though generally inefficient.

23. Polygamia—Stamina and Pistilla separate in some flowers, united in others, either on the same or on different plants—πολὺς many, γάμος marriage. A bad unnatural class, variable and obscure.

24. Cryptogamia—Flowers not discoverable, so as to be referred to the other classes—κρυπτός hidden or secret, γάμος marriage.

Appendix—*Palmæ*—a tribe of plants, chiefly tropical, little understood when Linnæus wrote, but daily clearing up, and removing to his classes, chiefly the sixth.

ORDERS—Subdivisions of the Classes.

Founded on the number of the Styles generally, at least in the 13 first classes—in the others on circumstances to be hereafter explained.

Tournefort founded his orders on the fruit, “because (says Adanson) that part comes after the corolla on which the classes are founded.”—This is a very bad reason, because having made out the class in his system, we must often wait a month or two for the fruit to determine
the

the order, whereas the Stamina and Styles must always be present at once.

Observations on examining plants.

Anomalies—exceptions—double or monstrous flowers.

ILLUSTRATIONS of the Linnæan CLASSES and ORDERS.

Monandria—only 2 Orders.

1. Monogynia—Style 1.—*Scitamineæ* a natural order, *Canna*, *Amomum*, &c.—*Hippuris*—*Salicornia*—*Lopezia*.

2. Digynia—Styles 2.—Few plants.—*Blitum*.

Diandria—3 Orders.

1. Monogynia—most natural and numerous—beautiful and fragrant *Jasmineæ*.—*Jasminum*,
Syringa,

Syringa, &c.—Irregular corollæ—*Veronica*, *Calceolaria*. Ringent flowers with naked seeds, allied to the class Didynamia—*Salvia*, &c.

2. Digynia—only *Anthoxanthum*, a grass.

3. Trigynia—only *Piper*.

Triandria—3 Orders.

1. Monogynia—*Valeriana*, an irregular genus. Some *liliaceæ*, and grass-like plants,—*Iris*, *Crocus*, &c.—*Schoenus*, *Cyperus*, &c.

2. Digynia—True Grasses—their habit and qualities—Genera obscure.

3. Trigynia—various little pink-like plants or *Caryophyllææ*.

Tetrandria—3 Orders.

1. Monogynia—very numerous and various—flowers with one or four petals.

Protea, *Bankia*, *Embothrium*, &c. a magnificent natural order. — *Scabiosa* — *Plantago* —
Ixora.

Ixora.—Natural order of Europæan *Rubiaceæ*.—*Dorstenia* a medicinal plant.

2. Digynia—various—*Buffonia*—*Cuscuta*.

3. Tetragynia—various—*Ilex*, a polygamous genus—*Sagina*—*Ruppia*.

Pentandria—6 Orders.

1. Monogynia — immensely numerous — flowers of one or five petals—below or above the germen.—Natural order of *Asperifoliæ*, 4 naked seeds.—Section of *Fl. Angiospermi inferi* contains some beautiful plants, some *luridæ*—many poisonous—narcotic.—Natural order of *Contortæ*.—*Monopetali superi*.—Some beautiful flowers.—*Pentapetali inferi*, and *superi*, various.—*Incompleti*, no corolla, few.

2. Digynia—*Monopetali inferi*, some *Contortæ*, &c.—*Gentiana*. *Incompleti*—few, *Chenopodium*, &c.—*Pentapetali superi dispermi*, the Natural order of *Umbelliferæ*.—Their characters and qualities — aromatic on dry ground, acrid and poisonous in wet.

3. Trigynia

3. Trigynia—various—*Rhus*, *Viburnum*, *Sambucus*, &c.—stigmata sessile in *Viburnum*. *Passiflora* really belongs here.

4. Tetragynia—only *Parnassia* and *Evolvulus*.

5. Pentagynia—various—*Statice*—*Linum*.

6. Polygynia — only *Myosurus* — remarkably few stamina and many styles.

Hexandria—5 Orders.

1. Monogynia—most numerous, as usual.

Flowers with proper calyx and corolla—various—*Bromelia*.

—— with *spathæ* — allied to *Liliacei* — *Narcissus*, *Allium*, &c.

—— naked (no calyx), proper *Liliacei*, nobles of the veg. kingdom.

—— incomplete (no corolla) few—*Juncus*, &c.

2. Digynia—few—*Oryza*.

3. Trigynia

3. Trigynia—various—*Rumex*.

4. Tetragynia—only *Petiveria*.

5. Polygynia—only *Alisma*.

Note, that uncongenial numbers are rare, and the styles are seldom so numerous as the stamina.

Heptandria—4 Orders—yet scarcely more than 10 Species !

1. Monogynia—*Trientalis*, *Disandra* (variable), and *Æsculus*.

2. Digynia—*Limeum*.

3. Tetragynia—*Saururus* and *Aponogeton*.

4. Heptagynia—*Septas*—a singular genus—Calyx in 7 parts, Petals 7, Germens 7, Capsules 7.

Octandria—4 Orders.

1. Monogynia—various and beautiful—*Tropæolum*—*Epilobium* and its allies—*Vaccinium*, *Erica*, *Daphne*.

H

2. Digynia

2. Digynia—few and rare—*Galenia*.
 3. Trigynia—not many—*Polygonum*, a variable genus.
 4. Tetragynia—*Adoxa*, *Paris*, &c.
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Enneandria—3 Orders.

1. Monogynia—*Laurus*—*Anacardium*.
 2. Trigynia—*Rheum* only, nearly allied to *Rumex*.
 3. Hexagynia—only *Butomus*.
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Decandria—5 Orders.

1. Monogynia — very numerous and very fine.

Flowers of several petals, irregular, allied to *Papilionacei*—*Cassia*, *Sophora*, &c.—with several regular petals, *Turraea*, *Pyrola*, *Dionaea*, *Melastoma*.

Fl. of one petal, regular—*Andromeda*, *Kalmia*, *Arbutus*, a beautiful American tribe.

Incompleti—few.

2. Digynia

2. Digynia—*Saxifraga*—*Dianthus*, with some of its allies.

3. Trigynia — several of the pink tribe—*Silene*, &c, also *Banisteria*, &c.

4. Pentagynia—more of the pink or campion tribe—*Lychnis*—(*Lychnis alpina* has but 4 styles) —*Oxalis*—*Cotyledon*—*Sedum*.—Some species of *Oxalis* are monadelphous.

5. Decagynia—only *Neurada*, and *Phytolacca* an irregular genus.

Dodecandria—5 Orders.

1. Monogynia—rather numerous, and very various—no affinities. — *Bocconia* — *Asarum*—*Befaria* (should be *Bejaria*)—*Halesia*—*Lytbrum*, &c.

2. Digynia—2 genera—*Heliocarpus* and *Agri-
monia*—the latter perhaps ought to be placed in the next class.

3. Trigynia—*Reseda*—*Euphorbia*, &c.

4. Pentagynia—*Glinus*.

5. Dodecagynia—about 12 styles—*Semper-
vivum*.

Icosandria—5 Orders.

1. Monogynia—Fine plants, bearing for the most part stone fruits, *drupæ*, which are almost all wholesome, though the leaves and other parts are bitter, acrid, and sometimes very poisonous, as *Prunus Lauro-cerasus*.—

The chief genera are *Cactus* (which has not much natural affinity with the rest)—*Eugenia*, *Myrtus*, *Punica*, *Amygdalus*, *Prunus*, &c.

2. Digynia—only *Cratægus*, and that inconstant.

3. Trigynia—*Sorbus* and *Sesuvium*.

4. Pentagynia—*Mespilus*, which perhaps forms one natural genus with *Sorbus* and *Cratægus*—*Pyrus*—*Spiræa*—*Mesembryanthemum*, and some other succulent alkaline plants.

5. Polygynia—an entirely natural order of *Rosaceæ*, the genera distinguished by their fruit and habit—*Rosa*, *Rubus*, *Fragaria*, *Potentilla*, *Tormentilla*, *Geum*, *Dryas*, *Comarum*, and *Calycanthus*—elegant plants—astringent.—An excellent example of a natural order and natural genera, well illustrated by Linnæus in *Flora Lapponica*.

Polyandria

Polyandria—7 Orders.

1. Monogynia—subdivided according to the number of petals—a very numerous and various order—handsome plants, but of a suspected quality.

Marcgravia—*Papaver*—*Capparis*—*Calophyllum*—*Cistus*—*Thea*—*Nymphaea*—&c.

2. Digynia—few—*Peonia*—*Fothergilla*.

3. Trigynia—*Delphinium* and *Aconitum*.

4. Tetragynia—few—*Cimicifuga*.

5. Pentagynia—*Aquilegia*, *Nigella*—allied to Trigynia.

6. Hexagynia—only *Stratiotes*, with a new genus of Schreber's, *Brasenia*.

7. Polygynia—for the most part natural—some fine exotic trees—*Wintera*, *Dillenia*, *Illicium*, *Liriodendron*, *Magnolia*, *Michelia*, *Annona*, &c.—others herbaceous, or climbing—*Anemone*, *Ranunculus*, *Adonis*, *Helleborus*, *Thalictrum*, *Clematis*, &c.—Mostly acrid plants, very different from the last class. Nothing can be more injudicious than uniting these two classes, as some inexperienced authors have done.

Didynamia

Didynamia—2 Orders only, each very natural on the whole.

1. Gymnospermia—seeds naked, four, except in *Phryma*. All labiated flowers, or at least with a monopetalous irregular corolla, a little inflated at the base, and holding honey, without any particular nectarium. Stamina 2 pair, incurved; style between them—impregnation rarely fails.—Plants mostly aromatic, and none (I believe) poisonous.

Calyx either in 5 nearly equal segments, or two-lipped.

Leonurus, *Lavandula*, *Mentha* (corolla of the last almost regular).

Thymus, *Origanum*, *Dracocephalum*, *Ocimum*, &c.

Prasium, seeds with a pulpy coat !

Phryma, seed solitary !

2. Angiospermia—seeds in a capsule, and generally numerous.—A great affinity with Pentandria Monogynia—some species even vary from one to the other, as *Bignonia radicans*, *Antirrhinum* *Linaria*, &c.—They agree too in qualities—often poisonous.

Subdivided

Subdivided by the number of divisions in the calyx.—Several of the genera named after botanists, as *Linnaea*, *Gesneria*, *Halleria*, *Columnæa*, *Martynia*, *Sibthorpia*, *Gerardia*, &c. &c.

Of those with Calyces quadrifidi many turn black in drying, as *Bartsia*, *Melampyrum*, *Rhinanthus*.—Cal. quinquefidi form the most numerous and natural tribe—*Scrophularia*, *Digitalis*, *Antirrhinum*, &c. *Melianthus* only of all the class has 4 petals.

Tetradynamia.

Most natural perhaps of all the Linnæan classes—*Cleome* only does not properly belong to the rest.

Plants vulgarly called antiscorbutic—supposed alkalescent—their essential oil smells like volatile alkali.

2. Orders—both perfectly natural.

1. Siliculosa—fruit a roundish pod—in some genera entire—*Draba*, *Lunaria*, &c. in others notched—*Alyssum*, *Thlaspi*, *Anastatica*, &c.

2. Siliquosa—fruit a very long pod—some genera have a *calyx clausus*, its leaves cohering
4 slightly

slightly by their sides, as *Raphanus*, *Cheiranthus*, *Hesperis*, *Brassica*, &c.—others have a spreading or gaping calyx, as *Cardamine*, *Sisymbrium*, *Sinapis*, &c.

Crambe, *Isatis*, and *Bunias* surely belong to the former order, having roundish pods—see *English Botany*, tab. 97. *Cleome* is an irregular genus; allied to the Polyandrous plants; its pod of one cell, instead of two like all true *Tetradynamia*, and its stamina very various in number and insertion in the different species, which are mostly foetid and very poisonous—scarcely any true *Tetradynamia* are noxious.

Monadelphia—9 Orders—distinguished by the number of their stamina.

1. Triandria—*Aphyteia* and *Galaxia*.
2. Pentandria—*Hermannia*, *Melochia*, *Erodium*, &c.
3. Heptandria — *Pelargonium* of L'Heritier, an excellent genus which includes most of the Cape Geraniums.
4. Octandria — only *Aitonia*, which has no natural affinity with the other orders.
5. Enneandria

5. Enneandria—only *Dryandra*.
6. Decandria—*Connarus*, *Hugonia* and *Geranium*.
7. Endecandria—*Brownea*, the proper number of whose stamina is doubtful.
8. Dodecandria—*Pentapetes*, with some new genera of Cavanilles and Schreber.
9. Polyandria—very numerous and magnificent—as *Gustavia*, *Gordonia*, *Stewartia*, *Carolinea*, *Camellia* and *Adansonia*—and most of the natural order of *Columniferæ* or *Malvaceæ*, as *Sida*, *Gossypium*, *Malva*, *Hibiscus*, *Althæa*, *Lavatera*, &c.

The Abbé Cavanilles has published upon this class, but perhaps has taken in too many genera.

Diadelphia—4 Orders.

1. Pentandria—only *Monniera*, a rare South American plant.
2. Hexandria—*Saraca*, and *Fumaria*.
3. Octandria—*Polygala*, *Securidaca* and *Dalbergia*.

4. Decandria

4. Decandria—by far the most numerous and natural order, consequently the genera very difficult to characterize—proper *Papilionaceæ*; or *Leguminosæ*.—Divided into sections variously characterized.

* *Stamina all united*, that is, all in one set; generally with a slit down the upper side of the tube—these really are not *diadelphous*, but *monadelphous*, and are a great stumbling block to accurate beginners, but Linnæus was unwilling to make a breach in so natural an order. The chief genera are

Spartium, *Genista*, *Lupinus*, *Ononis*, *Crotalaria*, *Platylobium* (a New Holland plant), *Aspalathus*, &c.

* * *Stigma downy*, without the character of the preceding section—*Phaseolus*, *Pisum*, *Lathyrus*, *Vicia*, &c.

* * * *Legumen imperfectly divided into two cells*—always, as in all the following, without the character of the preceding sections—*Astragalus*, *Phaca*, and *Biserrula*.

* * * * *Legumen with scarcely more than one seed*. *Psoralea*, *Trifolium* and *Glycyrrhiza*.

* * * * * *Legumen more or less jointed*.

Hedysarum, Coronilla, Medicago, Smithia, &c.

* * * * * *Legumen of one cell, with many seeds. Trigonella, Robinia, Indigofera, Cytisus, Galega, Lotus, &c.*

Some of these last are most allied to the Leguminous plants with *distinct* stamina at the beginning of the 10th class.

Plants of this class are scarcely any of them noxious to the larger animals, though some *Galegæ* intoxicate fish. The extremely poisonous quality of *Abrus precatorius*, asserted by the negroes, that half a seed will kill a man, is absurd. *Lathyrus sativus* is supposed at Florence to soften the bones, and cause death.

Polyadelphia—a small and rather unnatural Class.—4 Orders.

1. Pentandria—*Theobroma* and *Abroma*, with *Bubroma* of Schreber.

2. Dodecandria—only *Monsonia*, which perhaps is a *Geranium*.

3. Icosandria—only *Citrus*.

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4. Polyandria

4. Polyandria—most numerous—*Melaleuca*,
Hypericum, &c.

Syngenesia—

The great natural class of Compound Flowers, except the last order—mostly radiate—yet it neither contains all the compound nor all the radiate flowers.

The partial flowers, florets, are either *ligulate* or *tubular*, the former mostly in the *radius*, the latter in the *disk*—6 Orders.

1. Polygamia æqualis—florets all furnished with both stamina and pistilla.

* *Florets all ligulate—fl. semiflosculosi* of Tournefort.

Hieracium, *Leontodon*, *Sonchus*, &c. Milky and bitter.

* * *Capitati. Florets all tubular, and generally uniform and regular, in a round head.*

Carthamus, *Carlina*, *Carduus*, *Cynara*, &c.

* * * *Discoidei. Florets all tubular and regular, forming a surface nearly flat, or exactly conical.*

Cacalia,

Cacalia, Chrysocoma, Spilanthus, Bidens, &c.

2. Polygamia superflua—florets of the disk with both stamina and pistilla, those of the radius with pistilla only, and therefore in a manner *superfluous*.

* *Discoidei. Florets all tubular.*

Artemisia, Tanacetum, Gnaphalium, Xeranthemum, &c.

* * *Ligulati, subbilabiati. Perdicium only.*

* * * *Radiati—many.*

Bellis, Chrysanthemum, Aster, Mutisia: Siegesbeckia has one species with only 3 distinct stamina! and one *Tussilago* has distinct stamina, therefore Nature in this most natural class is not quite without exceptions.

3. Polygamia frustranea—florets of the disk with both stamina and pistilla, those of the radius without either (*flores neutri*).—Genera few, all radiate.—*Gorteria, Centaurea, Rudbeckia, Helianthus, &c.*

4. Polygamia necessaria—florets of the disk furnished with stamina, those of the radius with pistilla.

Filago, Calendula, Arctotis, &c.

5. Polygamia

5. Polygamia segregata—several flowers, either simple or compound, with a proper calyx, included in one common calyx.—Not numerous.

Echinops, Elephantopus, Gundelia, &c.

6. Monogamia—flowers simple—no affinity with the other orders, except in some of the genera to the last; the others naturally belong to *Pentandria Monogynia*.

Seriphium, Corymbium, Jasione, Lobelia, Viola, Impatiens, &c. The *antheræ* are separate in many *Lobelieæ* and *Violæ*.

Gynandria—

An odd and miscellaneous class, abolished by Thunberg.—9 Orders in Linnæus.

1. Diandria—the natural order of *Orchideæ* (except *Forstera*) a beautiful and singular tribe—their œconomy obscure—the genera ill defined.

Orchis, Ophrys, Cypripedium, Limodorum, Epidendrum, &c.

2. Triandria—*Salacia* and *Stilago*—the latter

is the male of *Antidesma*—*Sisyrinchium* and *Ferraria* really belong to *Monadelphica*.

3. Tetrandria—only the wonderful *Nepenthes*.

4. Pentandria—*Gluta* and *Ayenia*—*Passiflora* belongs to the 5th class.

5. Hexandria—*Aristolochia* and *Pistia*.

6. Octandria — only *Scopolia*, which is a *Daphne*.

7. Decandria—*Kleinbovia* and *Helicteres*.

8. Dodecandria—*Cytinus* only.

9. Polyandria — several — *Grewia* — *Pothos*, *Calla*, *Arum*, &c.

Monoecia—11 Orders, distinguished by the characters of the preceding classes.

1. Monandria — *Chara*, *Casuarina*, *Cynomorium*, &c.

2. Diandria—only *Anguria* and *Lemna*.

3. Triandria—mostly grasses, *Zea*, *Coix*, *Carex*, *Typha*, &c. also *Phyllanthus*, *Hernandia*, &c.

4. Tetrandria

4. Tetrandria—*Urtica*, *Morus*, *Buxus*, &c.
5. Pentandria—*Amaranthus*, *Leea*, *Ambrosia*, *Parthenium*, &c, the 2 last compound flowers.
6. Hexandria — *Zizania* and *Pharus*, both grasses.
7. Heptandria—only *Guettarda*.
8. Polyandria—stamina more than 7.—*Sagittaria*, *Begonia* — many *Amentaceæ*, as *Quercus*, *Juglans*, *Corylus*, *Platanus*.
9. Monadelphia — *Pinus*, *Cupressus*, *Croton*, *Ricinus*, *Hura*, *Sterculia*, &c.
10. Syngenesia—Cucumber tribe, *Trichosanthes*, *Cucurbita*, *Cucumis*, *Bryonia*, &c.—*Heritiera*.
11. Gynandria—*Andrachne* and *Agyneja*.—A paradoxical order, and the character of *Agyneja* is very doubtful.

Dioecia—14 Orders.

1. Monandria—*Pandanus*, *Najas*, and some new genera of Schreber.
2. Diandria—*Valisneria*, *Cecropia* and *Salix*—an assemblage of singularity, beauty and utility.
3. Triandria

3. Triandria—*Empetrum*, *Restio*, &c.
4. Tetrandria—*Viscum*, *Myrica*, *Hippophae*, &c.
5. Pentandria—*Pistacia*, *Antidesma*, *Spinacia*, *Cannabis*, *Humulus*, &c.
6. Hexandria—*Tamus*, *Smilax*, *Rajania* and *Dioscorea*.
7. Octandria—*Populus*, *Rhodiola* and *Margaritaria*.
8. Enneandria—*Mercurialis* and *Hydrocharis*.
9. Decandria—*Carica*, *Coriaria*, &c.
10. Dodecandria—*Menispermum*, &c.
11. Icosandria—*Flacourtia* of L'Heritier, and *Hedycarya* of Schreber.
12. Polyandria—*Cliffortia*, &c.
13. Monadelphia—*Juniperus*, *Taxus*, *Cissampelos*, &c.
14. Syngenesia — *Ruscus*, and *Xanthe* of Schreber.
15. Gynandria—only *Clutia*, more properly *Chuytia*.

Polygamia—3 Orders.

1. Monoecia—Flowers with stamina, others with pistilla, and others with both, all on one plant.

Musa, Veratrum—several grasses, as *Andropogon, Holcus, &c.* — *Parietaria, Atriplex, Clusia, Acer, Mimosa, &c.*

2. Dioecia—The different flowers on two different plants. *Fraxinus, Panax, &c.*

3. Trioecia—only *Ceratonia* and *Ficus*.

Cryptogamia—4 Orders.

1. Filices, *Ferns*,—consisting only of a *Frons*, that is, a leaf bearing fructification, either on its back (*dorsiferæ*), or the lobes are metamorphosed as it were into spikes of capsules—more rarely the spike of capsules originates from the leaf, but is distinct from it.—The order wants some reformation.

3 Sections.

* *Fructifications in spikes.* *Equisetum, Onoclea, Ophioglossum,*

Ophioglossum, *Osmunda*—*Cycas* and *Zamia* surely are Palms, or at least not Ferns in any sense.

* * *Fruct. on the back of the leaf.*—True dor-
liferous ferns—in two divisions, 1st, *annulatæ*,
whose fructifications are for the most part
covered with a membranous involucre, and
the capsules pedicellated, of two valves, bound
with an elastic ring: and 2d, *thecatæ*, whose
capsules are sessile, bursting by pores, without
ring or involucre.

Much regard is to be paid to the direction in
which the involucre bursts. See *Memoirs of
the Turin Academy*, Vol. 5.

* * * *Fructifications radical*—

Marsilea, *Pilularia* and *Isoetes*.

Of this last section, with some of the *spicatæ*
and the genus *Lycopodium*, Schreber has made a
new order called *Miscellanæ*, which can be
tolerated only till we know the subject better.

2. Musci, *Mosses*,—their Essential Character
reformed—Flowers naked. Capsule of one cell
and one valve, with a cover bursting all round,
and a veil.

Barren flowers—Stamen 1, cylindrical, trun-

cated, opening at the top. Pollen globular, conglutinated, scattered when the young capsule begins to be elevated on its flower-stalk.

Fertile flowers—Germen ovate, on a flower-stalk. Style erect, fringed, gradually dilated into a funnel-shaped stigma. Capsule — see above—margin naked, or fringed with one or more rows of teeth. Seeds small, numerous.—Use of the Veil (*Calyptra*) unknown.

Mosses Monoecious or Dioecious.

Old opinions.—Micheli discovered and figured the true barren flowers, but mistook the fertile ones, and was moreover quite ignorant of the fecundation of plants. Dillenius took the one precisely for the other, and yet absurdly called *capsula* what he believed to be *anthera*. Linnaeus too implicitly followed him, only correcting that blunder. Haller, Necker, and most other writers never understood the matter at all.

Dr. Hedwig of Leipzig examined all that had been done, detected the truth, raised mosses from seed, and established their characters as above.

Mosses are found in the hottest and coldest climates,

climates, extremely tenacious of life, revivescant, beautiful—species very numerous.

The Linnæan Genera are artificial, founded on the situation of the capsule—those of Hedwig, formed from its *ciliæ* or teeth, are very difficult, and still for the most part artificial.

3. Algæ, *Flags*, root leaf and stem all in one—incorrect—a vague order, rather containing *Cryptogamia* which are neither *Filices*, *Musci*, nor *Fungi*.

* *Terrestres*—

Marchantia, *Jungermannia*, *Targionia*, *Byssus*, &c. *Lichen*—its shields or tubercles, taken by Linnæus for barren flowers, are with great probability asserted by Hedwig to be the fertile ones.—A great genus—Its qualities and œconomy—the first beginning of vegetation.—Not hurtful to trees, *Relhan*.

** *Aquaticæ*.

Tremella, *Ulva*, *Fucus*, *Conserva*—

Remarks on their generic characters.

Most of them not nourished by roots.

Observations of Reaumur and Major Velley.

4. *Fungi*,

4. Fungi, *Mushrooms*,—their character and habit.—By some thought of an animal nature—Munchausen and Scopoli suspected, but Weis asserted it.—Dr. Büttner, Professor at Gottingen, observed white tender little bodies like eggs in putrid *fungi*, which became *larvæ*, *pupæ* and then flies. — This proves nothing. — Munchausen thought these animals formed the *fungus* as polypes do corals—how then should they be in the state of eggs in a perfect *fungus*?—Corals grow with their *animalcula*.—Some others have thought *fungi* were formed of the sap of corrupted wood transmuted as it were !

Hedwig proves *fungi* to have parts of fructification, and to produce seeds.

They propagate their species regularly, though subject to varieties like other plants.

Dryander asserted their vegetable nature well.

* *Pileati*.

Agaricus, Boletus, Hydnum, Phallus.

* *Pileo destituti*.

Clathrus, Helvella, Peziza, Clavaria, Lycoperdon, Mucor.

Perfoon

Perfoon and Tode have of late much increased the *genera* of *fungi*.

Morbid exudations and excrescences are to be carefully distinguished from them.

* * *

Palmæ—*Palm-trees*—an appendix to the Lin-
næan System, only till better understood.

Superb plants—Princes of the Vegetable King-
dom.

Allied to *Liliaceæ*, and even Ferns and Mosses.

Stem simple — lofty — long lived—crowned
with a tuft of evergreen leaves—found chiefly be-
tween the tropics.

Hortus siccus or *Herbarium*—necessary.

Methods of preserving plants—the more simple
the better—bruising spoils plants, heat makes
them brittle.

Many elaborate methods are recommended,
all which generally torture the plant out of its
6 natural

natural habit, the most important thing to be preserved.

Plants dry very variously — blues generally fade, as do some reds—yellows are most permanent, and some whites. *Orchideæ* turn black—glutinous and succulent vegetables are very troublesome.

Weak spirits preserve the form admirably, but no colours.

See Dr. Withering's paper on preserving fungi, *Transf. of Linn. Soc. Vol. 2.*

Herbarium best kept without a constant fire.

FINIS.

